Proposal Reviews

#209: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

University of California, Davis

Initial Selection Panel Review	
Research and Restoration Technical Panel Review	
Bay Regional Review	
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Prior Performance/Next Phase Funding	#1 #2
Environmental Compliance	
Budget	

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 209

Applicant Organization: University of California, Davis

Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**X**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**-**

Amount: **$199,732**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None

Provide a brief explanation of your rating:

This is an excellent proposal by a highly qualified applicant. The project will address a significant water-quality problem (selenium) that could adversely affect reproductive success of white sturgeon, causing adverse population-level consequences for this valuable species in the Bay-Delta ecosystem. The justification, conceptual framework, goals, and design of the proposed work are sound, and the Panel believes that project results will be relevant and useful to managers. The budget is reasonable, and the likelihood of successful completion is very good.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 209

Applicant Organization: University of California, Davis

Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
-Superior	**Overall, this is a very sound proposal to undertake important research by well-qualified investigators. It appeared to be the best of the toxicology proposals reviewed. Results from this work should be highly relevant for green sturgeon as well.**
XAbove average	
-Adequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   Yes on both counts. The goal of the proposed study is to determine the effects of Se bioaccumulation on physiology and reproduction of white sturgeon in San Francisco Bay-Delta. The investigators hypothesize that white sturgeon in San Francisco Bay-Delta experience physiological disturbances related to their large tissue Se burden, as well as disruption of egg development due to maternal transfer of selenium to eggs during vitellogenesis. They will test these hypotheses by assessing the correlation between Se tissue burden and physiological effect in different life stages of wild white sturgeon, and by determining the effects of exogenous, microinjected Se on the development and survival of white sturgeon embryos and yolk sac larvae.

This study is well justified based on existing information. The authors present ample evidence for serious problems with selenium contamination in San Francisco Bay, and describe a conceptual model explaining their reasons for concern about the effects of selenium on the health and reproduction of white sturgeon.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

   The investigators propose to approach the problem of selenium contamination and effects in white sturgeon with a combination of laboratory and field studies. They will collect young-of-the-year juveniles, subadult, and adult sturgeon from several sites in the San Franciso Bay/Delta area and measure tissue Se levels, fish age, weight and length, somatic indices, histopathology, and levels of glutathione and related enzymes. Effects of Se contamination on egg and larval development will be investigated using a procedure in which Se is microinjected into embryos and freshly hatched larvae at doses similar to environmental bioaccumulation levels.

   The study design is carefully described and well-documented, and is well-suited for meeting the objectives of the project. The use of microinjection techniques to study developmental effects of Se exposure is an interesting approach that should provide useful data on Se concentrations associated with larval deformities in sturgeon. There are some concerns about how well this procedure will work, but the uncertainties are recognized. The only issue raised concerning the approach was that the rationale was not clear for including microinjection studies in both eggs and yolk-sac larvae. Seemingly, egg exposure would have been adequate. This one issue kept the proposal from being overall rated as superior.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   The investigation is likely to produce scientific publications containing valuable information on 1) selenium bioaccumulation in sturgeon and its relationship to tissue damage or other measures of growth and health (e.g., fish condition index) and 2) toxicity thresholds for Se toxicity to sturgeon embryos and larvae.

   This information can be used by managers to evaluate risks to sturgeon of selenium contamination and determine appropriate actions in regard to source control, cleanup and restoration activities.

   A technical report is not mentioned as a product, but would probably be useful in case of any delay in publishing the information in peer reviewed journals.

   Data will also be made available to the California Water Resources Control Board and the California Department of Fish and Game for incorporation into regional data management systems.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget for this project seems quite reasonable for the scope and the utility of the work proposed.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   Ranked medium and low by 2 regional panels. Low rating was due to a perceived lack of tie-in to management concerns, whereas we felt the derivation of realistic thresholds for adverse effects is a strong management need.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   Apparently a good track record overall within CALFED, budget was fine, some minor ESA and NEPA considerations, not considered to be limiting.

Miscellaneous comments:

Some useful comments and suggestions were provided by one of the external reviews.

Bay Regional Review:

Proposal Number: 209

Applicant Organization: University of California, Davis

Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

Overall Ranking: **X**Low **-**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

The panel supports research that delivers scientific information which improves understanding about key species and habitats which are insufficiently understood. But this projects linkages to management actions are unclear.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   .

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   .

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   .

4. Does the project adequately involve local people and institutions?

   -Yes **X**No

   How?

Need mechanism to ensure translation or utilization of research results.

Other Comments:

Similarity (overlap?) to UCD-based proposal by Teh, but lack of cross referencing of these two projects puzzling.

Delta Regional Review:

Proposal Number: 209

Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

Overall Ranking: **-**Low **X**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

The recent reduction of wastewater discharge quantities by the State Board and the potential problems collecting the sturgeon lowered the priority of this proposal.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   Applicant has demonstrated that he is fully capable of the work, having completed several CALFED projects and delivered the results. UC Davis lab is fully capable of this type of analysis. Applicant will collect juvenile and adult sturgeon from DFG sampling and may supplement collection with recreational fishery. Because sturgeon are not listed, no ESA consultation is required. Adult sturgeon monitoring by CDFG will be done between August and October 2002 contrary to the dates indicated on the proposal time table. The proposal indicates that a total of 3-50 juveniles and 30-50 adults are wanted which may be difficult to achieve.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   Ecosystem Restoration Program Strategic Goals ¡V By furthering our understanding of the effects of toxins on sturgeon, this work addressed Goal 6 (Restore shallow water Delta habiats to benefit at-risk species, while minimizing contaminants' adverse effects).

   Regional Implementation Priorities ¡V Multi-region. This work must be done to assess the effects of contaminants on sturgeon recruitment and addresses MR-5 which strives to ensure that restoration is not threatened by poor water quality. Also addresses MR-6 which strives to complete conceptual models across regions. This work will also address the impacts of a non-native invasive species (Potamocorbula).

   CVPIA Priorities ¡V CVPIA 3402(a) protects, restores, and enhances fish and wildlife in the Central Valley. This work would address this directive, especially considering that sturgeon are anadromous. Also relates to 3406(b)(1) which authorizes the AFRP to make all reasonable efforts to double anadromous fish by 2002.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   This work is related to previously funded CALFED projects studying the effects of selenium in the San Francisco Bay-Delta. Author indicates that this will complete the selenium/sturgeon studies. This project relates to future studies that may impact selenium contamination and may provide valuable information in the formation of selenium standards.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   Project involves no land acquisition and sampling is assisted by CDFG. Work has been discussed with personnel at UC Davis and California State Water Resources Control Board.

Other Comments:

h Completes the selenium studies on white sturgeon.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **209**

Applicant Organization: **University of California, Davis**

Proposal Title: **Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Overall, this is a very sound proposal to undertake important research by well-qualified investigators.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goal of the proposed study is to determine the effects of Se bioaccumulation on physiology and reproduction of white sturgeon in San Francisco Bay-Delta. The investigators hypothesize that white sturgeon in San Francisco Bay-Delta experience physiological disturbances related to their large tissue Se burden, as well as disruption of egg development due to maternal transfer of selenium to eggs during vitellogenesis. The will test these hypotheses by assessing the correlation between Se tissue burden and physiological effect in different life stages of wild white sturgeon, and by determining the effects of exogenous, microinjected Se on the development and survival of white sturgeon embryos and yolk sac larvae.

These goals, objectives, and hypotheses are clearly stated in the proposal, and the need for such a study is well-documented with background information on selenium conamination in San Francisco Bay, as well as evidence from the literature for its potential adverse effects on fish.

Rating: Excellent

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Such a study is justified based on existing information. The authors present ample evidence for serious problems with selenium contamination in San Francisco Bay, and describe a conceptual model explaining their reasons for concern about the effects of selenium on the health and reproduction of white sturgeon. They provide good evidence for biomagnification of selenium through the food chain, likely resulting in tissue levels of selenium in sturgeon commensurate which those associated with adverse effects in other fish species. They also provide good evidence for potential transfer of selenium to developing eggs, resulting in developmental abnormalities The classification of this project as research if consistent with project goals and the type of work proposed.

   Rating: Excellent

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The investigators propose to approach the problem of selenium contamination and effects in white sturgeon with a combination of laboratory and field studies. They will collect young-of-the-year juveniles, subadult, and adult sturgeon from several sites in the San Franciso Bay/Delta area and measure tissue Se levels, fish age, weight and length, somatic indices, histopathology, and levels of glutathione and related enzymes. Effects of Se contamination on egg and larval development will be investigated using a procedure in which Se is microinjected into embryos and freshly hatched larvae at doses similar to environmental bioaccumulation levels.

   The study design is carefully described and well-documented, and is well-suited for meeting the objectives of the project. The use of microinjection techniques to study developmental effects of Se exposure is an interesting approach that should provide useful data on Se concentrations associated with larval deformities in sturgeon.

   The information generated from this project should be very useful to decision-makers, because the field studies will provide information on actual Se concentrations in sturgeon from San Francisco Bay, while the microinjection experiments will provide accurate data on toxicity thresholds for developmental effects of this compounds.

   Rating: Very good

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

The methods to be used in proposed research approach (e.g., microinjection exposures of larvae and embryos, analytical methods for measuring Se in tissues, lipid peroxidation, and glutathione levels are described in detail and fully documented with references from the current literature. Quality assurance procedures for analyses are also described. Success seems very likely, especially considering that the investigators have considerable experience with reproduction of white sturgeon and with selenium toxicity, and have completed substantial background research related to this project. Rating: Excellent

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Performance measures are outlined in a timeline giving deadlines for completion of project tasks. This should allow progress to be easily tracked.

   Rating: Very good

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The investigation is likely to produce scientific publications containing valuable information on 1) selenium bioaccumulation in sturgeon and its relationship to tissue damage or other measures of growth and health (e.g., fish condition index) and 2) toxicity thresholds for Se toxicity to sturgeon embryos and larvae.

   This information can be used by managers to evaluate risks to sturgeon of selenium contamination and determine appropriate actions in regard to source control, cleanup and restoration activities.

   A technical report is not mentioned as a product, but would probably be useful in case of any delay in publishing the information in peer reviewed journals.

   Data will also be made available to the California Water Resources Control Board and the California Department of Fish and Game for incorporation into regional data mangement systems.

   Rating: Very good

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The investigators appear to be well-qualified to carry out the project. The principal investigator is highly experienced and has published extensively on fish development and developmental toxicology, and the project manager and has experience and publications in this field, including work on reproduction of sturgeon. The third investigator is a Ph.D. candidate who has already conducted some published research on selenium toxicity in bivalves. The studies are to be conducted at UC Davis, which has good facilities for working with broodstock, larvae and embryos, and for conducting all chemical and physiological analyses. Also, the investigators have received CALFED funding in the past for research involving sturgeon and selenium contamination in the San Francisco Bay-Delta ecosystem, and have done considerable research

on reproductive characteristics of sturgeon, techniques for spawning and rearing broodstock, and on dietary exposure of sturgeon to selenium.

Rating: Excellent

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The budget for this project seems quite reasonable for the scope and the utility of the work proposed.

   Rating: Very good

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **209**

Applicant Organization: **University of California, Davis**

Proposal Title: **Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**I am concerned about the measurement of other trace elements in biotic samples and how they might influence the interpreation of results.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Yes, the objectives and hypotheses are clearly stated. Yes, the proposal is timely.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Yes, the study is justified relative to existing knowledge. I did note that a couple recent publications on effects of selenium on fish in rivers is not cited such as Kennedy et al. (Kennedy, C.J., L.E. McDonald, R. Loveridge, and M.M. Strosher. 2000. The effect of

bioaccumulated selenium on mortalities and deformities in the eggs, larvae, and fry of a wild population of cutthroat trout (Oncorhynchus clarki lewisi). Archives of Environmental Contamination and Toxicology 39:46-52.). Flaws in Kennedy et al. (2000) are discussed in details in Hamilton and Palace (2001; Commentary: Assessment of selenium effects in lotic ecosystems. Ecotoxicology and Environmental Safety 50:161-166). Lemly (1999; Selenium transport and bioaccumulation in aquatic ecosystems: A proposal for water quality criteria based on hydrological units. Ecotoxicology and Environmental Safety 42:150-156) has also expressed concerns about selenium effects on fish in riverine systems.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The micro injection of eggs is unique. Use of selen-L-methionine is good but one sereis of injections could include selen-DL-methionine or selen-L-cystine as a comparison to the selen-L-methionine form. Interpretation of the results may be substantially different than effects from the maternal transfer and accumulation of organic selenium in eggs (i.e., protein bound) because the injection study would be for non-protein bound or un-incorporated selenium. One good aspect is the measurement of selenium eggs from wild sturgeon on the spawning sites. I suggust that a muscle tissue of the adults be coolected and analyzed to examine the correlation between adult tissue and eggs. Non-lethal tissue collection from endangered fish in the Colorado River baisn has been discribed in Waddell and May (1995; Selenium concentrations in the razorback sucker (Xyrauchen texanus): Substitution of non-lethal muscle plugs for muscle tissue in contaminant assessment. Archives of Environmental Contamination and Toxicology 28:321-326), Hamilton and Waddell (1994; Selenium in eggs and milt of razorback sucker (Xyrauchen texanus) in the middle Green River, Utah. Archives of Environmental Contamination and Toxicology 27:195-201), and Osmundson et al. (2001; Selenium concentrations in the Colorado pikeminnow (Ptychocheilus lucius): Relationship with flows in the upper Colorado River. Archives of Environmental Contamination and Toxicology 38:479-485). The analysis of muscle plugs is by neutron activation. The low number of ova being collected (20 stated in Task 2, Embryoes section) from adults seems too low for measurement of selenium by fluorometric method or hydride atomic absorption method. Yes, the research will generate novel information on selenium in white sturgeon. Are other trace elements of concern in San Francisco Bay? Will these elements be measured in any of the samples collected? Selenium interacts with a wide variety of trace elements (Diplock 1976, Marier, J.R., and J.F. Jaworski. 1983. Interactions of selenium. National Research Council of Canada, Publication No. NRCC 20643. 85 pages; Wilber, C.G. 1980. Toxicology of selenium: A review. Clinical Toxicology 17:171-230; Whanger, P.D. 1981. Selenium and heavy metal toxicity. Pages 230-255 In Selenium in Biology and Medicine, J.E. Spallholz, J.L. Martin, H.E. Ganther, editors. AVI Publishing Company, Westport, CT). In environmental situations where a variety of elements might be interacting, it seems reasonable to look for those interactions in samples that are collected. If the results of the study do not match those reported by others in field and laboratory studies, the explanation may be in the interaction os selenium with other elements. This interaction is of little concern in the egg study where eggs come from a clean source. However, interactions are a major concern in the wild adult study.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

The approach seems well documented and technically feasible. The adult portion of the study seems likly to suceed, but the egg portion is more risky. The egg proposal is certainly unique, and worth trying. The scale of the project about right.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   This section in the proposal was small and lacked detail. Quarterly reports were mentioned.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Yes. There are few studies on the effects of selenium on fish reproduction, so any addition to the literature is important. Publishing the information is important to on-going selenium investigations in Kansas/Nebraska, Idaho, Colorado, Utah, New Mexico, and other western states.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The applicant is outstanding with expertise with sturgeon, but has limited background on selenium. Assistant Linville should be gaining an understanding of the selenium literature and should be able to fill in that void. Yes, the project team seems qualified to complete the proposed project. The facilities mentioned in the proposal seems adequate to accomplish the project.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Yes, the budget seems reasonable. However, I did not see costs associated with analytical chemistry for measuring selenium and other elements in tissue, organs, eggs, etc. I assume they are part of the Supplies & Expendables column. I think that other trace elements should be measured in samples -- are costs for those analyses included.

Miscellaneous comments:

none

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **209**

Applicant Organization: **University of California, Davis**

Proposal Title: **Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**The proposal is excellent because it has the objective, justification, approach, and products described as they should be for a "research" project.**
-Good	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Excellent: The objectives and hypotheses are clearly stated and the information need is adequately described.

2. **<u>Justification.</u>** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Excellent: The biology of white sturgeon bioaccumulation of selenium and environmental levels of selenium support the project. The applicant suggests the exotic bivalve Potamcorbula has a high bioaccumulation of selenium, but the bivalve was introduced in the 1980's and is a relatively recent event in long lived white sturgeon.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Fair: The applicants note under the Justification section that the "project involves moderate uncertainty." The exposure history of long-lived migratory sturgeon is unknown. How the products will be used to implement effective management actions is not clear from the proposal.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Excellent: The approach is adequately documented and technically feasibile. The microinjection studies are apparently innovative but appear to have a high probability of producing useful informaion.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Good: A time line for milestones is provided in Table 1 of the proposal.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Good: The products will be of interest to the CALFED and other programs. However the use of the products by managers is not clearly identified. Could the findings lead to additional regulatory action?

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Excellent: The applicants have an excellent track record and available infrastructure.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Good: Costs seem reasonable and are described in considerable detail.

Miscellaneous comments:

Prior Performance/Next Phase Funding: #1

New Proposal Number: 209

New Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   CALFED # 00-B03, USBR # 00-FC-20-0113, Culture of Delta Smelt, Phase II and III

   CALFED # 00-B06, USBR # 00-FC-20-0142, Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed, Phase II

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   None

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   XYes -No -N/A

   If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   XYes -No -N/A

   If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

-Yes -No **X**N/A

If no, please explain:

Other Comments:

Prior Performance/Next Phase Funding: #2

New Proposal Number: 209

New Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   98-C15 Biological Assessment of Green Sturgeon in the Sacrmento-San Joaquin Watershed (Phase I)

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   none

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   XYes -No -N/A

   If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   XYes -No -N/A

   If no, please explain any inaccuracies:

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

   -Yes -No **X**N/A

If no, please explain:

Other Comments:

Reporting and project coordination could be improved but not considered a significant issue.

Environmental Compliance:

Proposal Number: 209

Applicant Organization: University of California, Davis

Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   -Yes **X**No

   If no, please explain:

   Incidental take of listed species (gill netting) requires compliance with FESA and CESA. Such compliance requires corresponding NEPA and CEQA documentation.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   -Yes **X**No

   If no, please explain:

   Except for the caveat discussed under item 1 of the Environmental Compliance checklist.

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

Other Comments:

Budget:

Proposal Number: 209

Applicant Organization: University of California, Davis

Proposal Title: Selenium Effects on Health and Reproduction of White Sturgeon, Acipenser transmontanus, in the Sacramento-San Joaquin Estuary

1. Does the proposal include a detailed budget for each year of requested support?

   XYes -No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes -No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes -No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes -No

   If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   XYes -No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

6. Does the budget justification adequately explain major expenses?

   XYes -No

   If no, please explain:

7. Are there other budget issues that warrant consideration?

-Yes **X**No

If yes, please explain:

Other Comments: